REMARKS

Upon entry of this amendment, independent claim 12 with dependent claims 13–16 and 18-20 will be present in the application.

Claim 21 has been canceled. Accordingly, the rejection of claim 21 under 35 U.S.C. § 112, first paragraph, and the objection to the drawings are moot.

Claims 12-16 and 18-20 were rejected under 35 U.S.C. § 112, first and second paragraphs. Claim 12 has been amended to recite that at least one disc (10) extends from an inner side mounted to the inner jacket wall (7) to a medium flow-through side disposed at a distance from the outer jacket wall (8) and at least one ring (9) extends from an outer side mounted to the outer jacket wall (8) to a medium flow-through side disposed at a distance from the inner jacket wall (7), as is shown in Figures 5 and 6. Claim 13 has been amended to conform with claim 12.

Claims 12-16 and 20 are now rejected under 35 U.S.C. § 103(a) as being obvious over U.S. 3,475,137 (Kuo) in view of U.S. 3,656,548 (Donaldson). Claims 18 and 19 are now rejected under 35 U.S.C. § 103(a) as being obvious over Kuo, Donaldson and "Applicants' Admitted Prior Art" (Figure 1of the subject application).

The Office Action alleges that it would have been obvious "to employ in Kuo et al a baffle having a medium flow-through side with a perimeter contour and web for the purpose of minimizing pressure drop in the shell side flow as recognized by Donaldson." A careful review of the Donaldson reference reveals that there is absolutely no disclosure regarding "minimizing pressure drop in the shell side flow" or even "minimizing pressure drop". The only disclosure regarding "shell side flow" is that "each of the baffles 37 comprises a generally circular piece having a chordal segment removed from one side to afford a passage for the first heat exchange fluid. The baffles are arranged alternately in spaced relation with the removed segment of alternate baffles on opposite sides of the heat exchanger shell 17 to provide a tortuous path ... for a first heat exchange fluid from the inlet 20 at one end of the shell to the outlet 22 at the other end of the shell. Col. 2, lines 55-63. "The tortuous path through which the first heat exchange fluid flows operates to maximize the heat exchange efficiency of this device." Col. 4, lines 4-6. Donaldson does not disclose any specific purpose for the shape of the edge of the baffle 37 left by

removing the "chordal segment" and certainly does not a "medium flow-through side" shaped in the manner shown in Figure 2 of Donaldson will in any way minimize pressure drop in the flow of the first heat exchange fluid. Attributing any purpose for shaping the "medium flow-through side" in the manner shown in Figure 2 is pure conjecture.

The subject application teaches that heating or cooling medium flow that is directed transversely to the tubes can act upon the tubes with pulsating forces such that they are induced to oscillate and, in the worst case, are mechanically loaded by constant oscillation, particularly in the resonant range of the tubes. The natural frequency of the tubes is primarily determined by the tube diameter, the wall thickness of the tubes and the interval of the support points (tube plates, baffles that support a tube). In conventional heat exchangers, the edge tubes (i.e., the tubes lying in the area of the outer or inner jacket region) are held by every second baffle, providing baffle intervals that allow flow induced oscillation at the natural frequency of the tubes. As further taught by the subject application "all of the tubes [of the subject tube bundle heat exchanger] are supported in such a way that the frequency of the first harmonic oscillation of the tubes is in all cases above the generation frequency of the tubes resulting from the medium flow, and as a result of that, no oscillation resonance occurs on the tube bundle tubes". More specifically, in the tube bundle heat exchanger of claim 12, the disc 10 defines "a web surrounding all of the outermost set of the tubes" and the ring 9 defines "a web surrounding all of the innermost set of the tubes", whereby the baffle interval of the subject heat exchanger is reduced to the distance between the disc and the ring instead of the distance between discs or the distance between rings.

As shown above, Donaldson does not teach "minimizing pressure drop in the shell side flow". A close examination of both the Kuo reference and the Donaldson reference reveals that neither reference is concerned about flow induced vibration of the heat transfer tubes. Accordingly, a person of ordinary skill in the art would not contemplate modifying the device of Kuo to include any of the features of the Donaldson device in order to minimize pressure drop in the shell side flow or to mitigate the effects of flow induced vibration of the heat transfer tubes. "It is insufficient that the prior art disclosed the components of the patented device, either separately or used in other combinations; there must be some teaching, suggestion, or incentive to make the combination made by the

inventor." Northern Telecom Inc. v. Datapoint Corp., 15 USPQ2d 1321, 1323 (Fed. Cir. 1990). "There must be something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination." Interconnect Planning Corp. v. Feil, 227 USPQ 543, 551 (Fed. Cir. 1985). Since the Office Action does not suggest any other motive for combining the Kuo and Donaldson references, the rejection of claim 12 must be withdrawn.

The Applicants further submit that the Donaldson reference does not provide any teaching, suggestion or incentive to modify either the rings and discs of the tube bundle heat exchanger shown in Figure 1 of the subject application or the baffles 35, 36 of the Kuo reference to include the "undulating shape" shown in Figure 2 of Donaldson. Donaldson does not disclose any specific purpose for the shape of the edge of the baffle 37 left by removing the "chordal segment". At best, it may be inferred that the "undulating shape" of the open end of the baffle 37 provides clearance between the end of the baffle 37 and the tubes disposed adjacent the end of the baffle 37. In the subject heat exchanger, there are no tubes adjacent to the ring/disc ends since the rings and discs define webs that surround all of the outermost set of the tubes and all of the innermost set of the tubes, respectively. Consequently, there is no need to provide an undulating shape to the ends of the rings and discs to obtain clearance between the ring/disc ends and adjacent tubes.

The various dependent claims add additional features to the independent claims, and are therefore believed to be allowable. Also, the dependent claims are believed patentably distinct on their own merits as being directed to combinations not suggested by the references.

In view of the above-directed amendments and the proceeding remarks, prompt and favorable reconsideration is respectfully requested.

Respectfully submitted,
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